

Mole[®]

DNA extraction from fish samples

“ GeneMole[®] is a benchtop instrument for automated nucleic acid purification. Automation reduces the risk of injuries caused by repetitive pipetting, limits exposure to chemicals and infectious agents, and gives you more time to focus on other operations. GeneMole[®] can process 1-16 samples in one run and all the reagents required are available as pre-filled disposable MoleStrips[™]. ”



Figure 1
Salmon (*Salmo salar*) is consumed as food all over the world, with other seafoods, it is the world's prime source of high-quality protein.

Introduction

Genetics has a key role to play in helping aquaculture meet the world's growing demand for fish; improving performance of farmed fish, help fish farmers satisfy consumer demands and even influence how farmed and wild fish interact in nature. In the wild, fish genetic resources help determine the productivity of fish populations and their adaptability to environmental stresses, such as climate change and human development. The application of DNA markers has allowed rapid progress in aquaculture investigations of genetic variability and inbreeding, parentage assignments, species and strain identification, and the construction of high-resolution genetic linkage maps for aquaculture species. Here we have used the GeneMole[®] instrument to extract DNA from the turbot (*Scophthalmus maximus*), Norwegian Cod (*Gadus morhua*) and Salmon (*Salmo salar*), which are important species in the food industry and of great commercial value.

Methods

Fish tissue samples were stored at -20°C prior to DNA extraction. The fish samples were dissected into tiny pieces. GeneMole[®] is constructed to handle an input of 1-20 mg of tissue, but the optimal amount of input material will vary due to different tissue compositions. The muscle tissues were taken from different parts of the fish body and therefore contained various amounts of bone and skin.

The samples were weighed and 100 µl lysis buffer for MoleStrip[™] DNA Tissue with 2 µl of 20 mg/ml Proteinase K solution was added per 10mg tissue. The samples were digested by incubating in an Eppendorf Thermomixer Compact at 56°C, with 950 rpm. The incubation time varied between 2 and 24 hours. After incubation the samples were spun shortly on a table centrifuge, to separate unsolved bone pieces from the solution. The supernatant was pipetted into sample tubes, and genomic DNA was extracted according to the protocol given in the MoleStrips[™] DNA Tissue kit. An elution volume of 100 µl was specified.

Results

GeneMole® is constructed to handle an input of 1-20 mg of tissue. For DNA extraction from fish muscle and fins, 10 mg tissue was used as input, and the DNA was eluted in 100 µl elution buffer. This gave a DNA concentration of 39-170 µg/ml (table 1).

Table 1: DNA extracted from fish tissue from muscle and fins tested on the GeneMole® instrument.

Sample	Input	Elution volume [µl]	Yield [µg]	Conc. [µg/ml]	A260/A280
Cod Muscle	10 mg	100	3.9	39	2.20
Cod Fins	10 mg	100	8.0	80	2.10
Turbot Muscle	10 mg	100	3.4	34	2.23
Turbot Fins	10 mg	100	7.5	75	1.98
Salmon Muscle	10 mg	100	17.0	170	2.02
Salmon Fins	10 mg	100	11.3	113	2.09

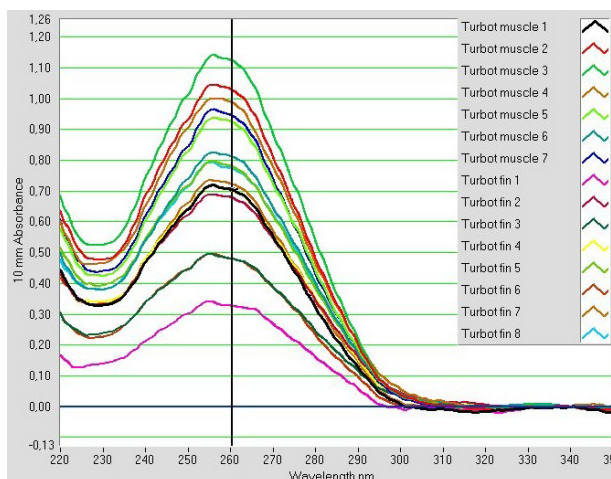


Figure 2: NanoDrop results of GeneMole® extracted DNA from muscle and fin tissue samples from Turbot .

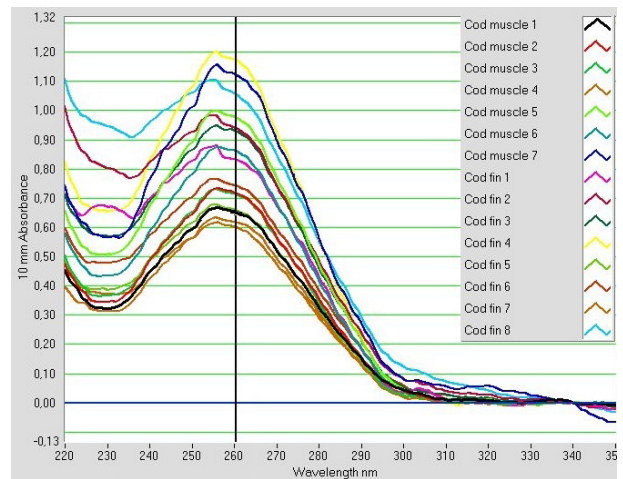


Figure 3: NanoDrop results of GeneMole® extracted DNA from muscle and fin tissue samples from Cod.

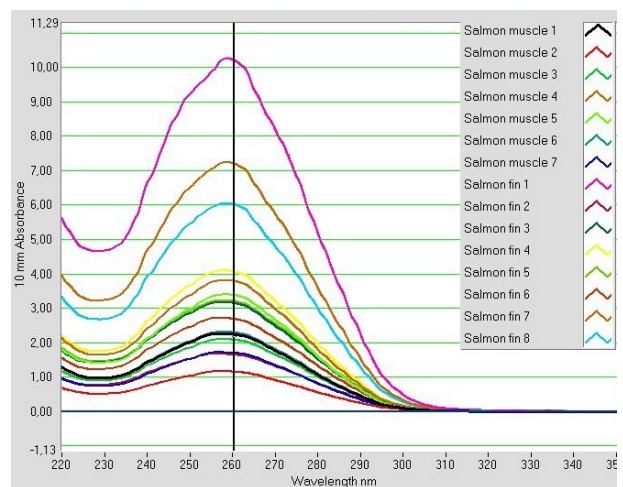


Figure 4: NanoDrop results of GeneMole® extracted DNA from muscle and fin tissue samples from Salmon .

Conclusion

All tissues are different in composition and therefore the optimal amount of starting material and the final DNA yield will vary from tissue to tissue. The GeneMole® instrument is ideal for automated DNA extraction from different fish samples, it strongly reduces hands on time and provides nucleic acids of high quality and yield. Both fresh and frozen tissues can be used for extraction.

Acknowledgement

Fish samples were kindly provided by the Norwegian Institute for Water Research (NIVA). Mari Tjernsmo Andersen, Ida Caroline Furu and Anne Haukvik did the technical work as part of their Bachelor thesis.

Ordering Information

Product

GeneMole®

MoleStrips™ DNA Tissue

MoleStrips™ DNA Tissue Convenience Kit¹

Content

Instrument

64 Reagent Strips

32 Reagent Strips

Product Number

MG10-000-000

MGK20-101-102

MGK20-101-101

¹ The convenience kit contains 32 Reagent Strips and all the required tips, tubes and caps.